Problem Solving Using Spreadsheet Software – Block 2

Exercises

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The New York Taxi Driver's problem

- You are the operator of a taxi in New York City. You have just dropped off a passenger at LaGuardia Airport, which is approximately 12 miles from Manhattan –the centreof New YorkCity. Taxis queue to pick up passengers at LaGuardia, so you have two choices –enter the two hour queue for a passenger, or leave the airport empty to go looking for a fare in Manhattan.
- Which option would you choose ("stay" or "leave"), and how would you decide?

Remember the 4-step approach

Instructions

- This exercise should be partially completed on Moodle before your exercise class.
- It will work in 4 steps
  - In each step you will work first on your own
  - Next, you can answer some questions in a Moodle quiz
  - After completing the quiz you will get access to a solution
- This exercise is ungraded
- The final step will be completed in groups during your exercise class.

Step 1: Fill in the Problem Statement Sheet

Basic question to be resolved

1. **Perspective/context**
2. **Criteria for success**
3. **Scope of Solution Space**
4. **Constraints within solution space**
5. **Stakeholders**
6. **Key sources of Insight**

Step 1: Solution

Basic question to be resolved

After having dropped off passengers at LaGuardia airport, should the taxi driver leave the airport and look for a ride in Manhattan or wait at LaGuardia for other passengers to maximize his profits?

1 Perspective/context

Taxi driver needs to decide now as he has just dropped off passengers at the airport

2 Criteria for success

Selecting the option with maximum profit

3 Scope of Solution Space

Two options
–"stay" (and wait)
–"leave" (and search)

4 Constraints within solution space

In the hypothetical scenario no other options exist

5 Stakeholders

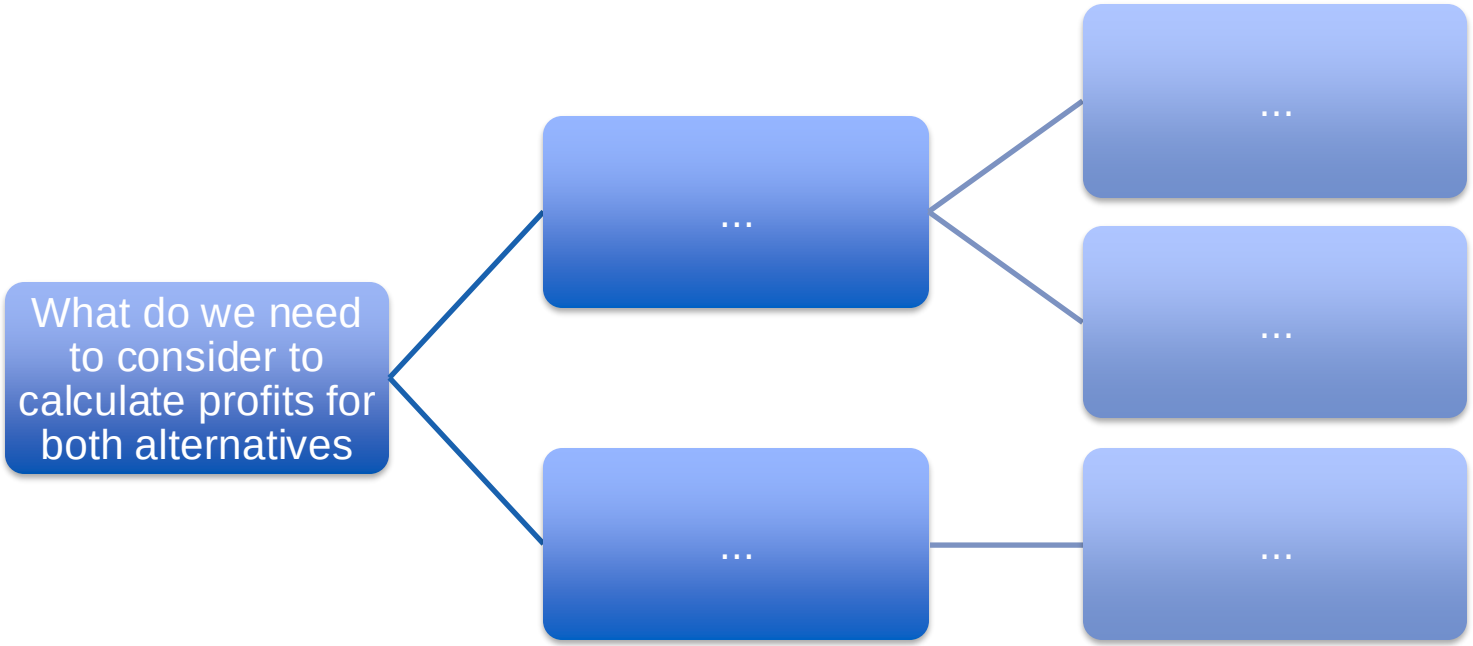
Taxi driver
Passengers
Other taxi drivers

6 Key sources of Insight

Interview with taxi driver

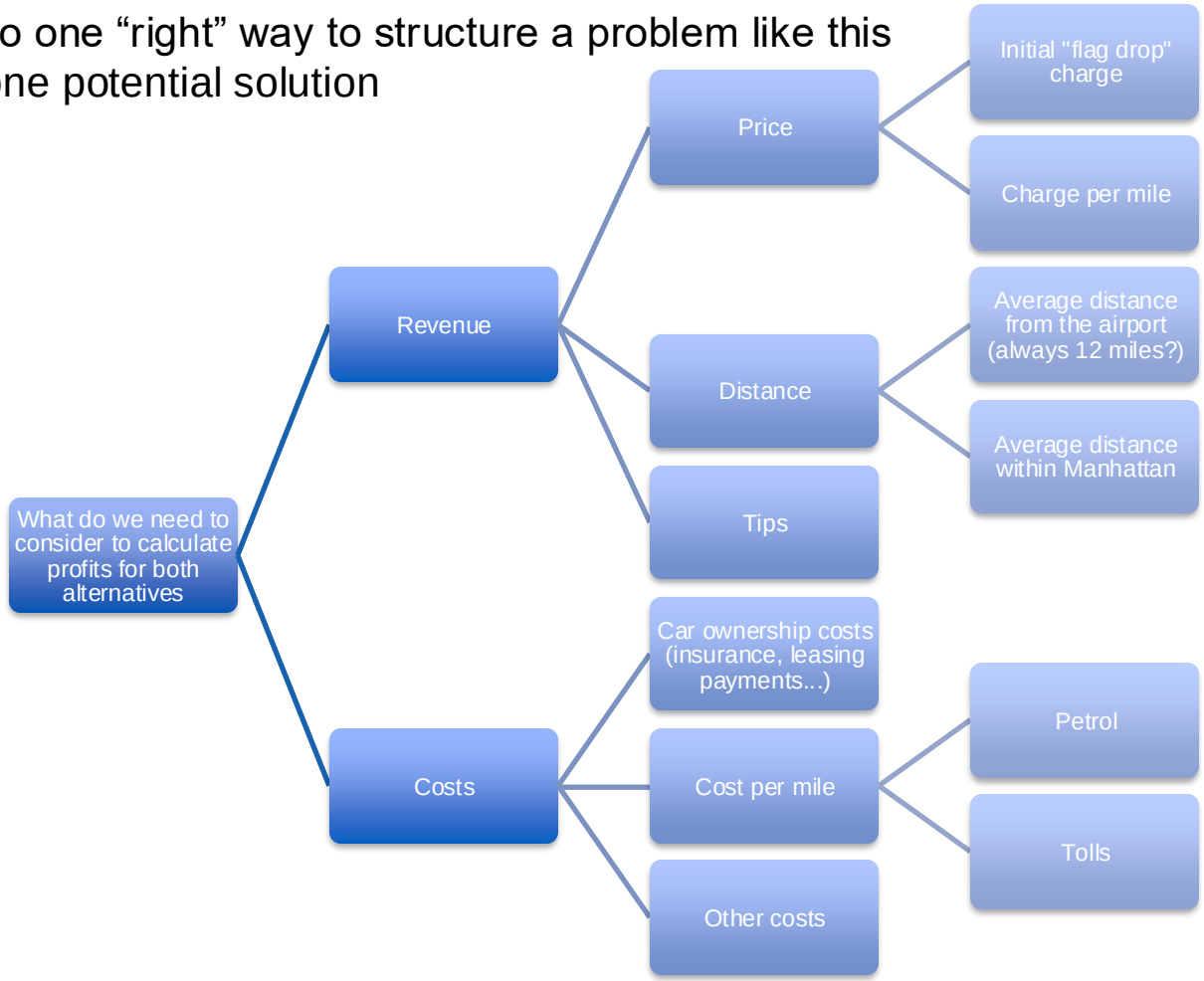
Step 2: Structuring the problem

- Before getting into the details, what factors would you consider in making your decision? Structure the problem into a “profit” tree for each alternative.



Step 2: Solution

- There is no one “right” way to structure a problem like this
- Below is one potential solution



Step 3: Solving the problem

- You will find a data sheet on Moodle
- Use the data the calculate the profit for both alternatives (for the same total time)
- At the end of the exercise class we will look at a solution

Step 4: Presenting the findings / solution

- What are our results?
  - What is the summary?
  - What is the sysnthesis?
  - What is the recommendation?
- Why do we come to these results?

Step 4: Solution

- Identical cash profit in both scenarios, “Stay” scenario could be probably preferable due to externalities (i.e., easier to sit than to drive, can do other activities such as reading while waiting, less risk of being robbed by an airport passenger than in the city)
- It is counterintuitive that cab driver who “wastes” two hours in the cab queue will earn the same profits as a competitor who spends the entire time working
- However, this is how the taxi system operates: e.g., length of wait at the airport cab queue will adjust to guarantee that the two profits will be equal. If the profits of the airport trip were higher, the airport queue would be longer. If the profits of the airport trip were lower, the airport queue would be shorter and airport passengers would continuously wait for a taxi
- In addition to the observations above, this is an indication that there is a near-perfect competition in the Taxi system in New York. In industries where there is perfect competition, options tend to converge upon the same level of benefit, so that no one option is better than another